

Do you like to eat crab? How about the King of Crabs? Although there are several species of King Crab in Alaska waters the Red King Crab is the most abundant and is the center of a popular reality television show on crab fishing in the Bering Sea. Red king Crab or *Paralithodes camtschaticus*, is a sought after marine species, prized the world over as a delicacy. The center of the Red King Crab abundance is in the Bering Sea. They live at depths averaging 800 feet where the water hovers just above freezing. Red King Crab can grow to be one of the largest crabs in the world, with leg spans of up to five feet!. Typically though they are smaller, a legal sized crab (one that can be harvested by fishermen) has a carapace (that's the part of the shell on their back) with a width of around 7 inches and a weight of 5 pounds. King Crab eat a variety of worms, starfish and even other crabs, and can live at least 10 years.

Because of the great value placed on this species, it has a history of being heavily fished before there were strong regulations as there are today. During the 1980's a severe drop in crab numbers, caused the Red King Crab to become scarcer. It was determined that the population was overfished (that is that the amount of fishing effort harvested more Crab than the population could support). As a result laws were put into place to prevent King Crab populations from shrinking further by allowing fishing, but with stricter regulations. It is important that populations of this species are regularly estimated to ensure that they recovering and gradually returning to higher levels. It is important to see if population numbers can tolerate the pressure from fishing.

What we want to know is if we are able to continue to taking crabs without the population shrinking further. That is why year after year we need to compare the size of the crab population to the amount of crabs being fished. What we look at is that rate at which new crabs are born to the rate at which crabs are taken. If more crabs are being taken each year than there are crabs being born, then the population will shrink overtime. If the population does not shrink with fishing, but stays the same, or even grows, then it is considered stable, and fishing can continue. One of the strategies to prevent further population shrinkage is to only take male crabs. Why do you think this might be?

Did you know scientists use several sampling methods for estimating Red King Crab Populations? Well they do. King Crabs live in a variety of habitats, some of which are very uneven and rocky, but there are times that they live on flat bottom too. So, there are two main types of sampling methods used; Bottom Trawls and Pots. Every summer King Crab populations are estimated, as are several hundred other species populations, during the Bering Sea bottom trawl surveys conducted by the NOAA Fisheries Alaska Fisheries Science Center

For the bottom trawl survey the trawling net is pulled across the bottom for about 30 minutes. In that time, a number of species are taken, which during a research cruise are also counted. On the research vessel, scientists who specifically study Red King Crab count the number of crabs pulled up during the trawl. One trawl is performed in a 20 square nautical mile region and the number of crabs counted are used to estimate the total number for that region. This is done throughout the Bristol Bay region, at 470 different stations. Using this technique, the entire bristol bay Red King Crab population is estimated.

So what about of the part of the crab population that lives in rocky habitats? In those places, large cage like traps called "pots" are used. Dozens of pots are put out across a sample area, total population

estimation is based on number of crabs from the pots, and “soak time” or how long the pots are left in the water.

The timing for both types of sampling methods are different as well. One of the reasons for this is that the crabs undergo a molting and mating cycle from February to May. Molting is an important life history stage in crabs, where they shed their old exoskeleton to grow new ones. Surveys are conducted every year, always in the months after the Molt/Mate cycle; Trawls are done from May to August, and pots generally from August to November. This strategy allows the crabs to be sampled once their shells have hardened, and gives them the opportunity to lay their eggs and mate without being disturbed.

Crabs live in a variety of habitats, some of which are inaccessible to both trawls and pots, like rocky near-shore areas. What this means is there can be a large amount of uncertainty involved in estimating King Crab Populations, so how is this accounted for in estimations? Tagging crabs and then tracking them can help to determine the extent of the population range by finding out what proportion of the population lives in the areas sampled by survey trawls. Knowing the proportion of crabs not included in a survey can help produce much more accurate models. It is also very difficult to accurately tell a crab's age. There are ongoing independent studies aimed at finding more useful ways to determine a crab's age as well. Understanding crab age will help to tell us more about how species like the Red King Crab, grow, reproduce, and most importantly, how quickly their population grows.